

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex Parte Choi et al.

Application for Patent

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Group Art Unit 1765

Examiner Lynette T Umez Eronini

For:

LINE EDGE ROUGHNESS CONTROL

REPLY BRIEF

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1. INTRODUCTION

This reply brief is presented in order to address the Examiner's responses to the Applicant's arguments made in the Appeal brief. Each of the Examiner's responses will be addressed individually.

2. STATUS OF CLAIMS

There are a total of 24 claims pending in this application (claims 1-5, 8-15, 18-26). Claims 16-17 are withdrawn from consideration.

3. GROUNDS OF REJECTION

A. The rejection of claims 1, 2, 4-7, 13, 14 and 18-20 under 35 U.S.C. 103(a) as being anticipated by Naeem et al. (U.S. Patent No. 5,846,884) in view of Hineman et al., (U.S. Patent No. 6,379,872).

B. The rejection of claims 3 and 12 under 35 U.S.C. 103(a) as being unpatentable over Naeem et al. (U.S. Patent No. 5,846,884) in view of Hineman et al., (U.S. Patent No. 6,379,872) and further in view of Chen et al. (U.S. Patent No. 6,080,662).

C. The rejection of claims 8 and 10 under 35 U.S.C. 103(a) as being unpatentable over Naeem et al. (U.S. Patent No. 5,846,884) in view of Hineman et al., (U.S. Patent No. 6,379,872) and further in view of Angelopoulos et al. (U.S. Patent No. 6,316,167).

D. The rejection of claims 21, 22, 25 and 26 under 35 U.S.C. 103(a) as being unpatentable over Naeem et al. (U.S. Patent No. 5,846,884) in view of Hineman et al., (U.S. Patent No. 6,379,872) as applied to claims 1, 2, 4-7, 13, 14 and 18-20 and further in view of Hills et al. (U.S. Patent No. 6,217,786).

E. The rejection of claim 15.

4. ARGUMENT

The improper finality of the Office Action

In the Appeal Brief, the Applicant argued that the Office Action was improperly labeled as “final” by the examiner for two reasons: (1) it alleges that a new ground of rejection was presented for claims 1 and 18 but fails to actually provide such a new ground of rejection; and (2) it fails to address arguments made by the Applicant in the previous amendment.

In response to these arguments, the Examiner states in the Answer that: “Applicants’ argument is unpersuasive and a new grounds of rejection was proper to address etching an --inorganic dielectric--, which was not originally present in the claims.”

The Examiner claims to issue a new grounds of rejection, but no such new grounds is presented. Rather, the same prior art (Naemm) is presented as allegedly teaching the same elements of the claims. This is not a new grounds of rejection. Cutting and pasting an old rejection into a new Office Action does not constitute a new grounds of rejection, even if the examiner swaps out the old claims for the newly amended claims. This violation of the M.P.E.P is made even worse by virtue of the fact that the Examiner did not address the arguments made by the Applicant in Amendment A, which clearly apply to the cut and pasted rejection as much as they did to the rejection in the prior office action. M.P.E.P. 707(f) requires that the Examiner take note of the Applicant’s argument and answer the substance of it. Here, however, the Examiner has deliberately ignored the Applicant’s argument and prematurely labeled the Office Action as final in order to avoid actually having to consider the Applicant’s argument. These actions are improper.

The failure of Naemm to teach or suggest protecting an inorganic dielectric during the etch

In the Appeal Brief, the Applicant argued, in part, that Naemm fails to teach or suggest protecting an inorganic dielectric during the etch. In response, the Examiner argues that protecting an inorganic dielectric during the etch is not a feature that is required by the claim.

The method of claim 1 is a method for etching an inorganic layer. As such, each of the steps of the method are performed during the etching process. It has already been established that several of the steps of the method act to protect the inorganic layer. This is implicit in the steps being performed (e.g., the application of the polymerization gas comprising CO and CH₃F, the stopping of the ARC open gas mixture before the layer to be etched is completely etched). As such, the claim does require that the inorganic dielectric be protected during the etch. Nevertheless, the Examiner apparently has misunderstood the Applicant's arguments.

It was the Examiner who chose to compare steps from Naemm to steps from claim 1. The protective steps that the Examiner found in Naemm, however, are undertaken to protect a metallization layer from an etch that penetrates an ARC layer, and are undertaken at the time that that particular etch is taking place. The etching of the inorganic layer in Naemm is performed at a completely different time, and there is nothing in Naemm to suggest that the protective steps be undertaken for the inorganic layer etch. Perhaps the Examiner was confused by the Applicant's description of the inorganic layer etch in Naemm as being performed at a different time. However, the etches are two different etches, and steps disclosed as being performed in one of the etches do not apply to steps being performed in the other. Different etches being

performed at different times using different steps and different substances. The fact that both etches are described in the same prior art reference does not make them equivalent etches, and the temporal differences between the etches are, in fact relevant, in that they delineate further that the etches are, in fact, separate and different.

The failure of Hineman to teach or suggest using specialized gases, pressures, or other chamber settings to help reduce or to eliminate the erosion of the substrate.

In the Appeal Brief, the Applicant argued that Hineman fails to teach or suggest using specialized gases, pressures, or other chamber settings to help reduce or to eliminate the erosion of the substrate. The Examiner responded by arguing that “Hineman is relied upon solely to show stopping the ARC etch before the layer (inorganic dielectric) is completely etched.

The Applicant and Examiner appear to be in agreement that Hineman shows stopping a first plasma etch process prior to the completion of an ARC etch by using a pre-selected duration for the etch or through the use of a detector, but does not show using specialized gases, pressures, or other chamber settings to help reduce or eliminate erosion of an inorganic dielectric layer. Applicant’s point is that Hineman cannot be combined with Naemm to teach all of the elements of the claimed invention because neither reference shows using the specialized gases, pressures, or other chamber settings described in the claims in order to reduce erosion that occurs when an ARC etch “goes too far” and begins to etch into the inorganic dielectric layer. Hineman seems to operate completely in ignorance of the possibility that the pre-selected duration may wind up being too long, the detector may malfunction, or some other event may occur that would cause the first plasma etch to etch into the inorganic dielectric layer. Indeed, as Hineman indicates, the etch would in fact stop prior to the

inorganic layer being etched, there would be no reason to combine it with Naemm and there would be no reason for the present claimed invention. The only reason the presently claimed invention is useful is because the inventors of the present invention recognized that an invention in the vain of Hineman does not work under real-world conditions to protect the inorganic layer.

For the above reasons, Applicant respectfully requests that the Applicant's positions be adopted by the board.

Respectfully submitted,
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